

What is claimed is:

1. A method for fabricating a film bulk acoustic resonator, the method comprising:

providing a dielectric layer on a substrate;

providing a sacrificial layer on a portion of the dielectric layer, while leaving a portion of the dielectric layer exposed to form an exposed dielectric layer;

providing a bottom electrode on the sacrificial layer and on the exposed dielectric layer;

providing a piezoelectric layer on the bottom electrode;

providing a top electrode on the piezoelectric layer; and

removing the sacrificial layer.

2. The method as claimed in claim 1, further comprising providing a second dielectric layer on the top electrode.

3. The method as claimed in claim 2, further comprising adjusting a thickness of the second dielectric layer in accordance with a desired resonance frequency.

4. The method as claimed in claim 1, wherein the providing of the bottom electrode includes depositing a conductive material on the sacrificial layer and on the exposed dielectric layer, the conductive material on the exposed dielectric layer forming a base section and the conductive material on the sacrificial layer forming an overhanging section.

5. The method as claimed in claim 4, wherein the providing of the bottom electrode further includes partially removing the conductive material forming the base section, so that a width of the conductive material forming the base section is smaller than a width of the conductive material forming

the overhanging section; and

wherein the providing of the top electrode includes depositing another conductive material on the piezoelectric layer and on the exposed dielectric layer, and patterning the another conductive material on the dielectric layer so that the top electrode includes a pad positioned in an area of the exposed dielectric layer where the conductive material forming the base section has been removed, the pad being spaced from the conductive material remaining in the base section.

6. The method as claimed in claim 5, wherein the providing of the piezoelectric layer further includes depositing a piezoelectric material on the bottom electrode and on the exposed dielectric layer and patterning the piezoelectric material on the exposed dielectric layer to include a portion of piezoelectric material in an area of the exposed dielectric layer where the conductive material forming the base section has been removed and separate from an area of the dielectric layer in which the pad is to be formed.

7. The method as claimed in claim 1, wherein the removing of the sacrificial layer forms an air gap between the bottom electrode and the dielectric layer.

8. The method as claimed in claim 1, wherein an upper surface of the sacrificial layer is higher than an upper surface of the dielectric layer.

9. The method as claimed in claim 1, further comprising, before the providing of the dielectric layer, forming a cavity on the substrate.

10. The method as claimed in claim 1, wherein the providing of the sacrificial layer includes filling the cavity with a sacrificial material.

11. The method as claimed in claim 10, wherein the filling of the cavity includes depositing the sacrificial material on the dielectric layer and the cavity and planarizing the sacrificial material to provide the exposed dielectric layer.

12. The method as claimed in claim 11, wherein the planarizing includes a chemical mechanical polishing process.

13. The method as claimed in claim 9, further comprising providing a second dielectric layer on the top electrode.

14. The method as claimed in claim 13, further comprising adjusting a thickness of the second dielectric layer in accordance with a desired resonance frequency.

15. The method as claimed in claim 9, wherein
the providing of the bottom electrode includes depositing a conductive material on the exposed dielectric layer to form a base section and on the sacrificial layer to form an overhanging section, and partially removing the conductive material forming the base section, so that a width of the conductive material forming the base section is smaller than a width of the conductive material forming the overhanging section; and

the providing of the top electrode includes depositing another conductive material on the piezoelectric layer and on the exposed dielectric layer, and patterning the another conductive material so that the top electrode includes a pad positioned on the exposed dielectric layer where the conductive material forming the base section has been removed, the pad being spaced from the conductive material forming the base section.

16. A film bulk acoustic resonator, comprising:

a substrate;

a dielectric layer on the substrate;

a bottom electrode on the dielectric layer, the bottom electrode including a base section and an overhanging section, the overhanging section being over an air gap between the bottom electrode and the dielectric layer;

a piezoelectric layer on the bottom electrode; and

a top electrode on the piezoelectric layer.

17. The film bulk acoustic resonator as claimed in claim 16, further comprising:

a second dielectric layer on the top electrode.

18. The film bulk acoustic resonator as claimed in claim 16, wherein a width of the base section of the bottom electrode is smaller than a width of the overhanging section of the bottom electrode, and the top electrode extends down to the dielectric layer in an area spaced from the base section, thereby forming a pad.

19. The film bulk acoustic resonator as claimed in claim 18, wherein the piezoelectric layer extends down to the dielectric layer in an area spaced from the pad.

20. The film bulk acoustic resonator as claimed in claim 16, wherein the substrate has a cavity and the overhanging section of the bottom electrode is over the cavity.

21. The film bulk acoustic resonator as claimed in claim 16, wherein the dielectric layer is substantially planar.

22. The film bulk acoustic resonator as claimed in claim 16, wherein the bottom electrode is substantially planar.

23. The film bulk acoustic resonator as claimed in claim 16, wherein an upper surface of the overhanging section of the bottom electrode is higher than an upper surface of the base section of the bottom electrode.

24. The film bulk acoustic resonator as claimed in claim 16, wherein the piezoelectric layer extends over the overhanging section and over part of the base section of the bottom electrode.